DOCKET NO. 2760

Fig. 1a

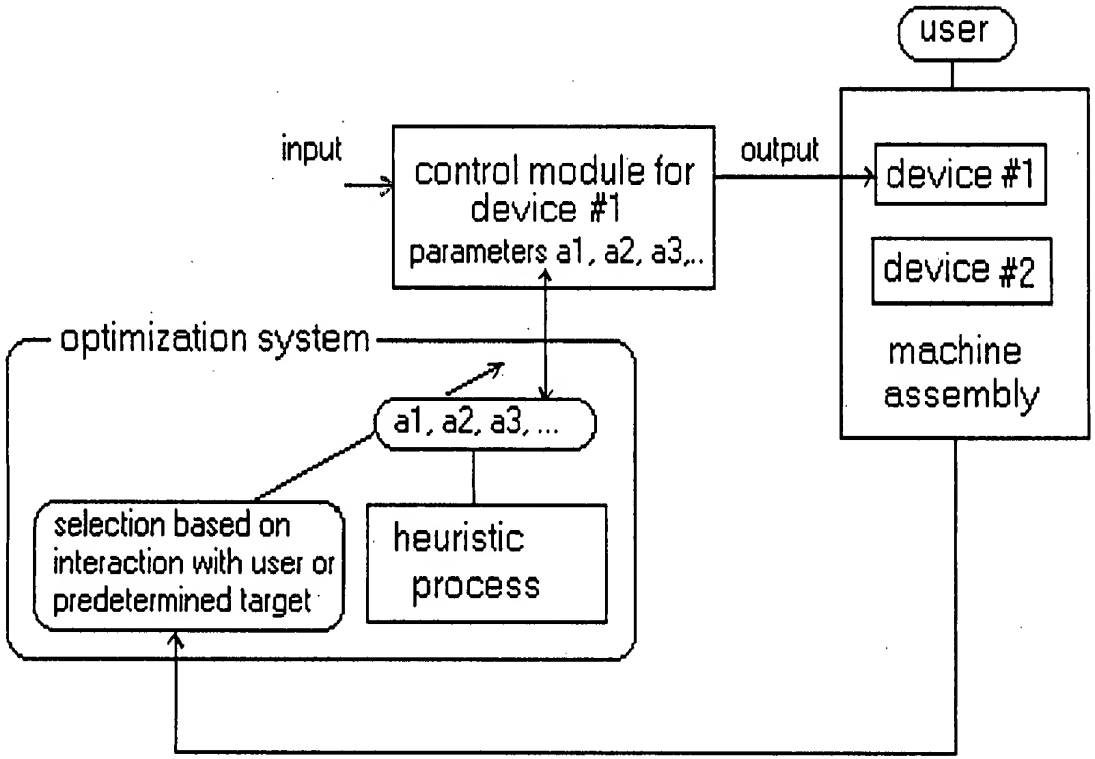


Fig. 1b

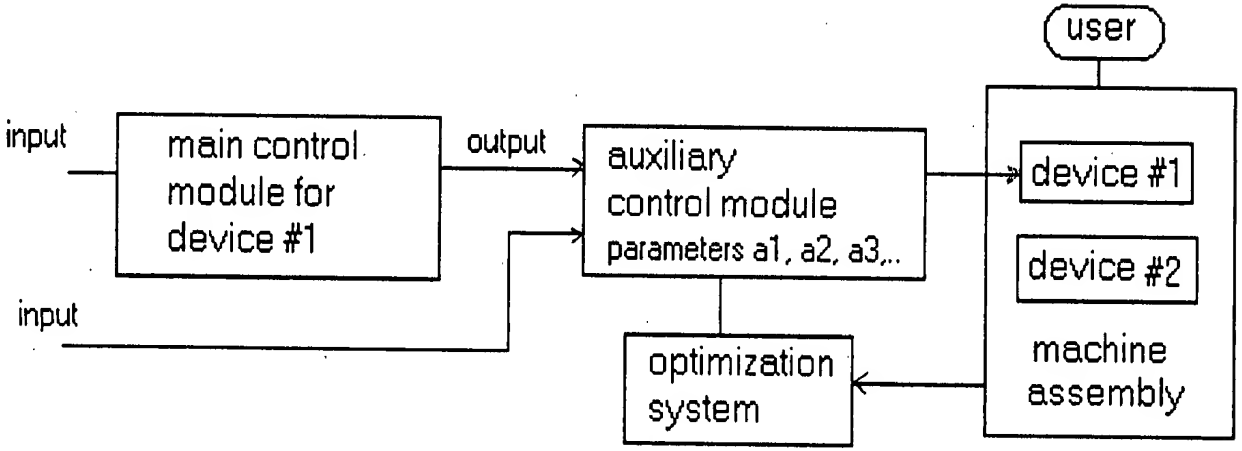

user
input
main control module for device #1
output
auxiliary control module
parameters a1, a2, a3,..
device #1
device #2
machine assembly
input
optimization system

Fig. 1c

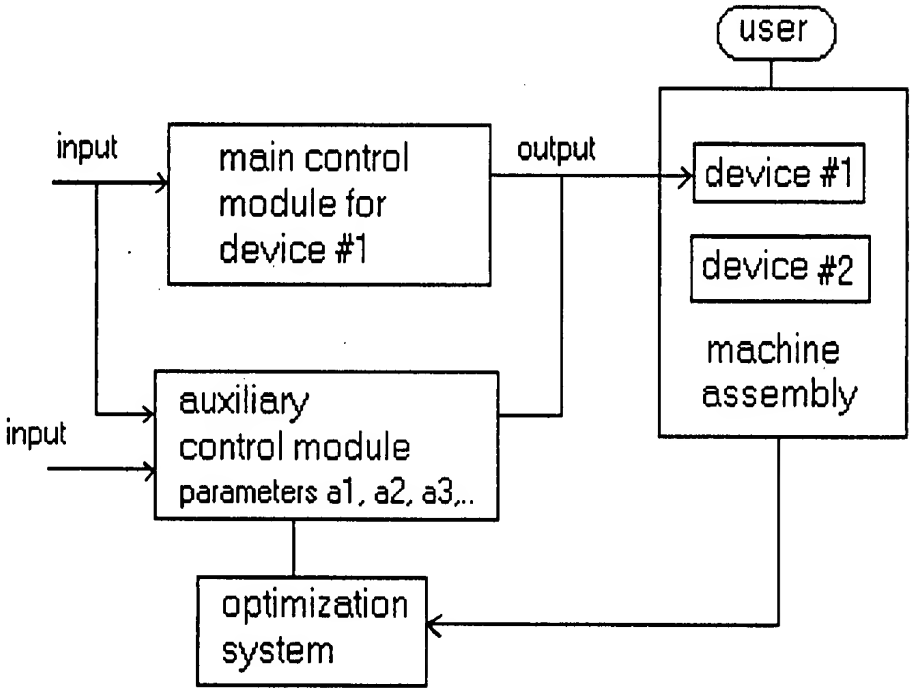

user
input
main control module for device #1
output
device #1
device #2
machine assembly
input
auxiliary control module
parameters a1, a2, a3,..
optimization system

Fig. 1d

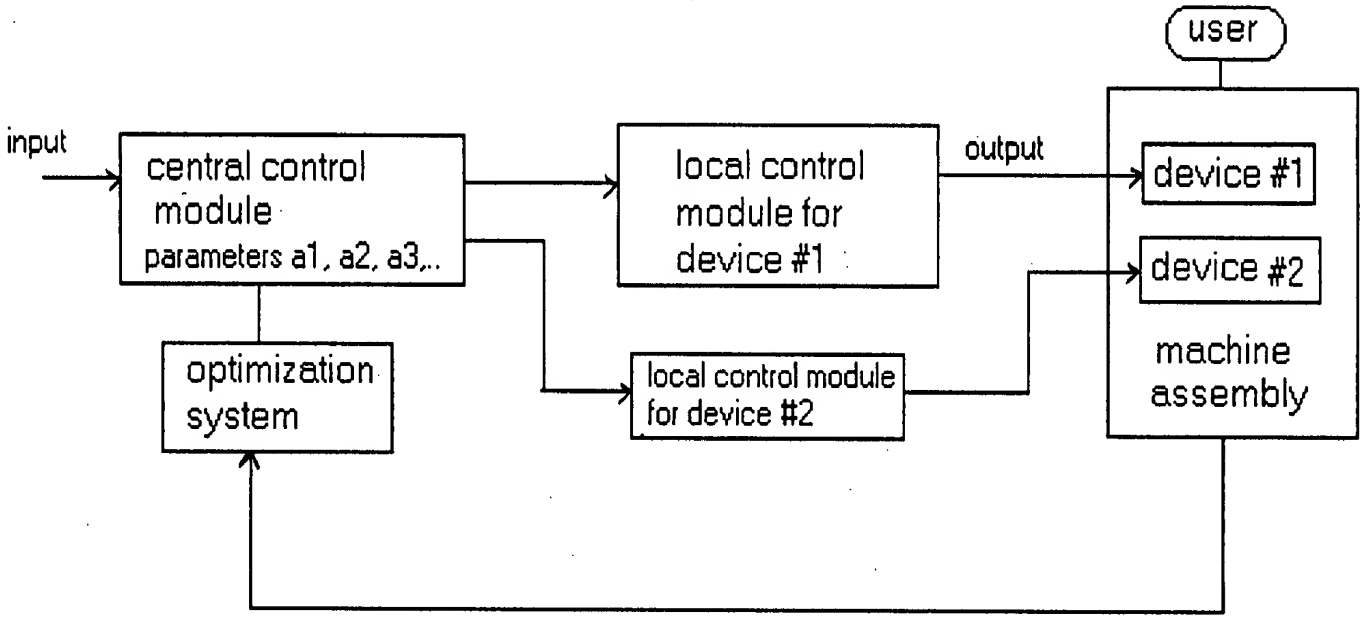
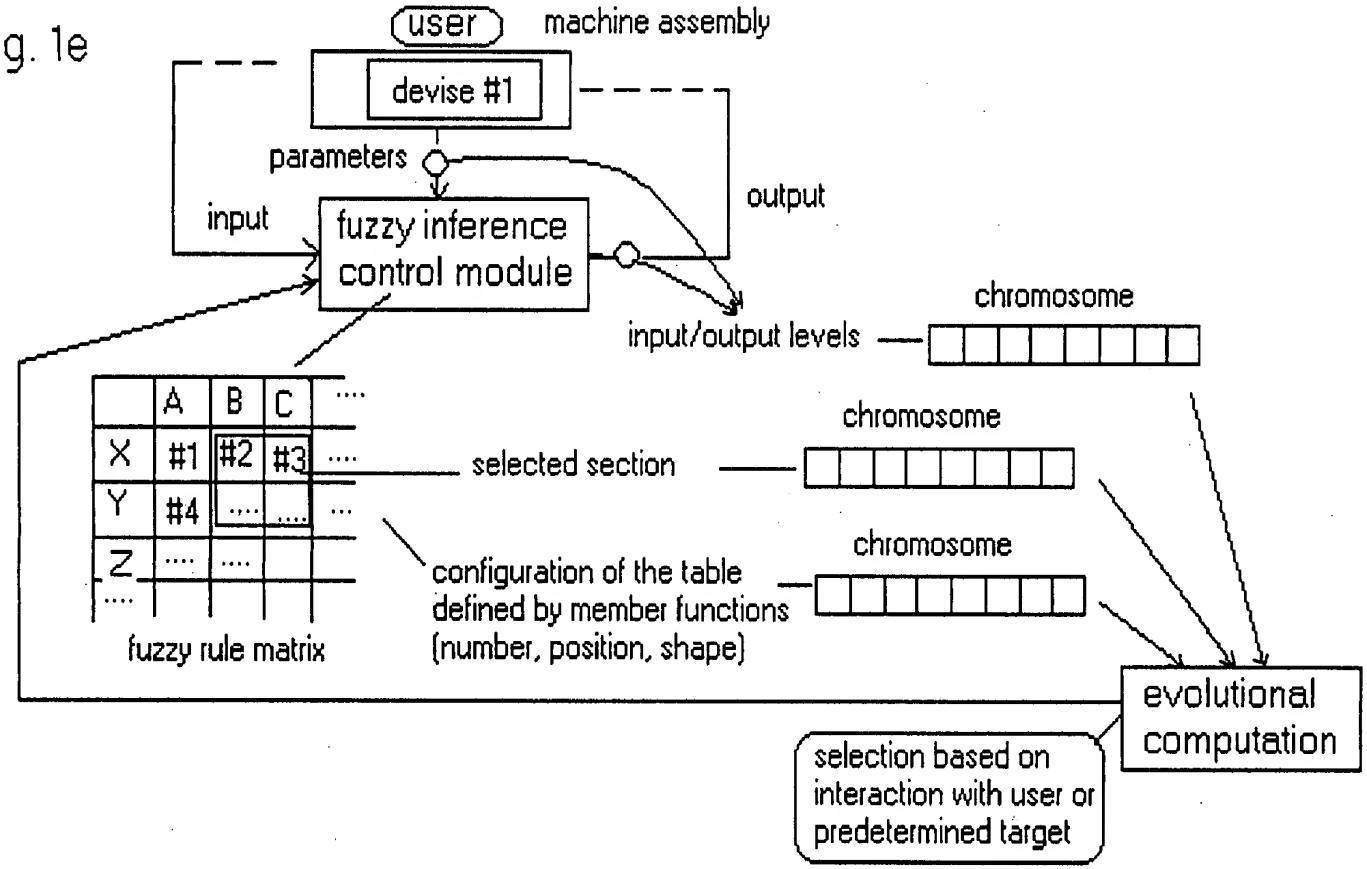

user
input
central control module
parameters a1, a2, a3,..
optimization system
local control module for device #1
output
local control module for device #2
device #1
device #2
machine assembly

Fig. 1e


user
machine assembly
devise #1
parameters
input
fuzzy inference control module
output
chromosome
input/output levels
A
B
C
X
Y
Z
#1
#2
#3
#4
selected section
chromosome
configuration of the table defined by member functions (number, position, shape)
chromosome
fuzzy rule matrix
evolutional computation
selection based on interaction with user or predetermined target

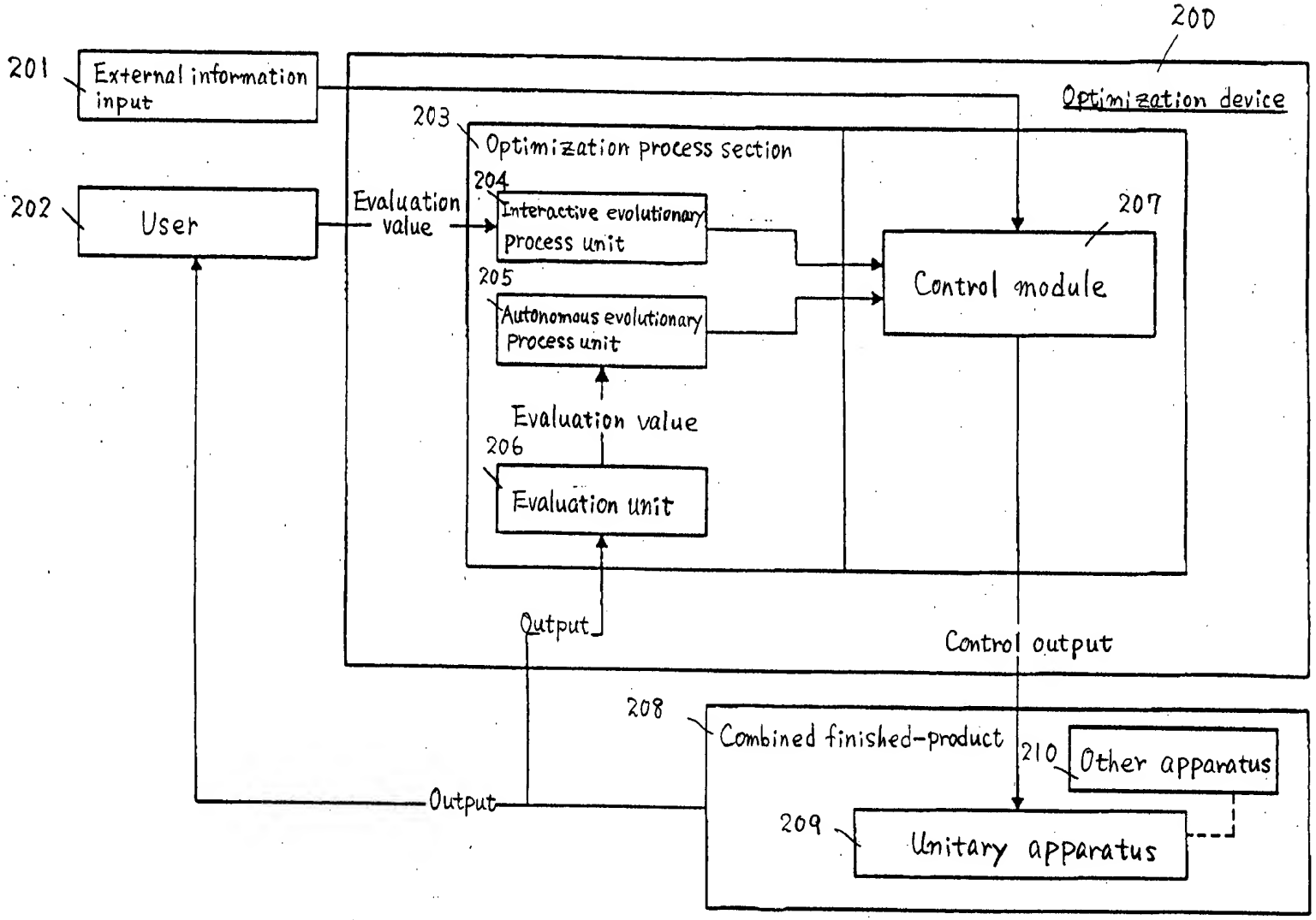

200
Optimization device
201
External information input
202
User
Evaluation value
203
Optimization process section
204
Interactive evolutionary process unit
205
Autonomous evolutionary process unit
206
Evaluation unit
Evaluation value
207
Control module
Output
Control output
208
Combined finished-product
210
Other apparatus
209
Unitary apparatus
Output

FIG. 2

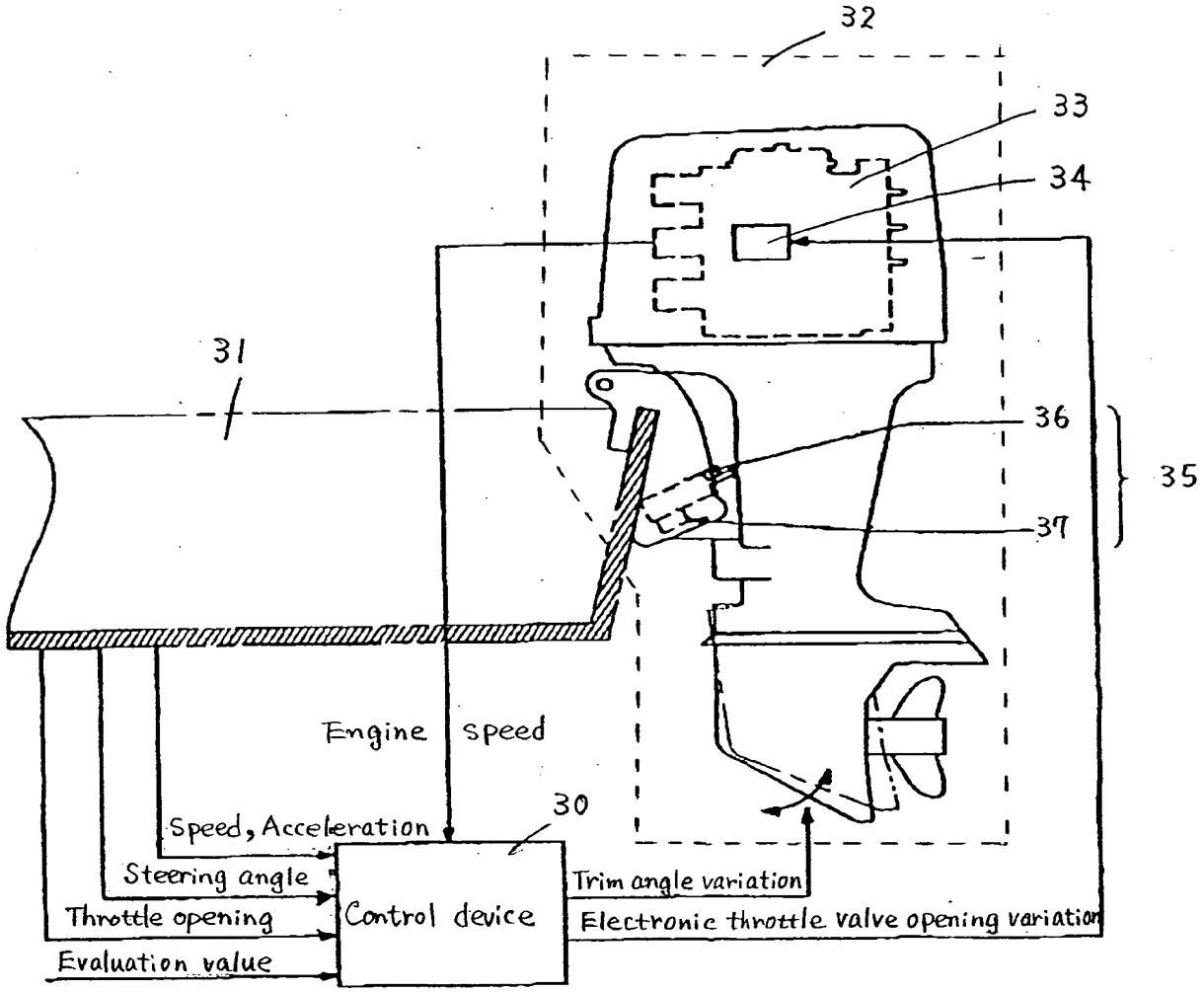

32
33
34
31
36
35
37
Engine speed
30
Speed, Acceleration
Steering angle
Throttle opening
Evaluation value
Control device
Trim angle variation
Electronic throttle valve opening variation

FIG. 3

0070ET "tch2260

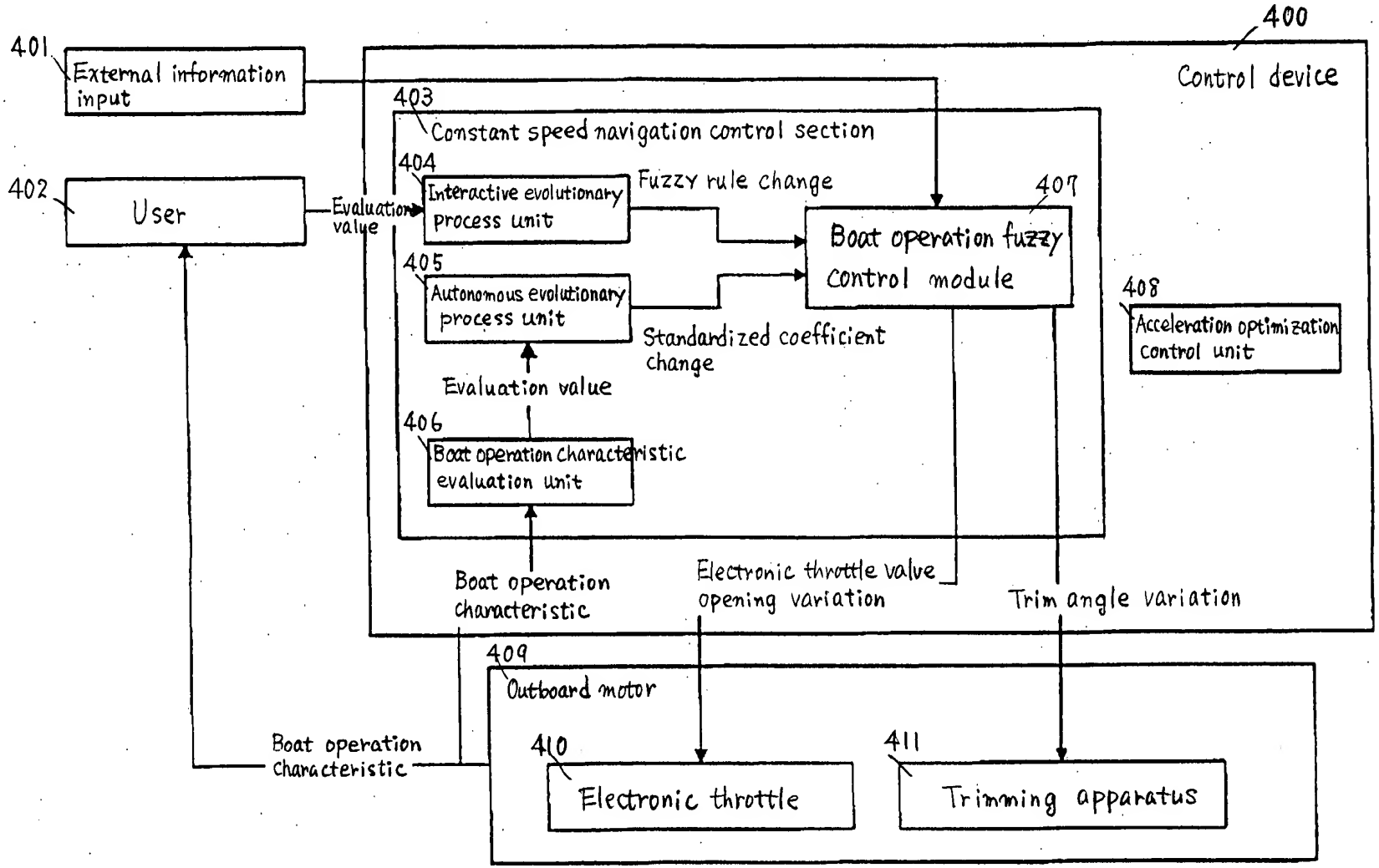


FIG. 4

DOCKET NO. 2260

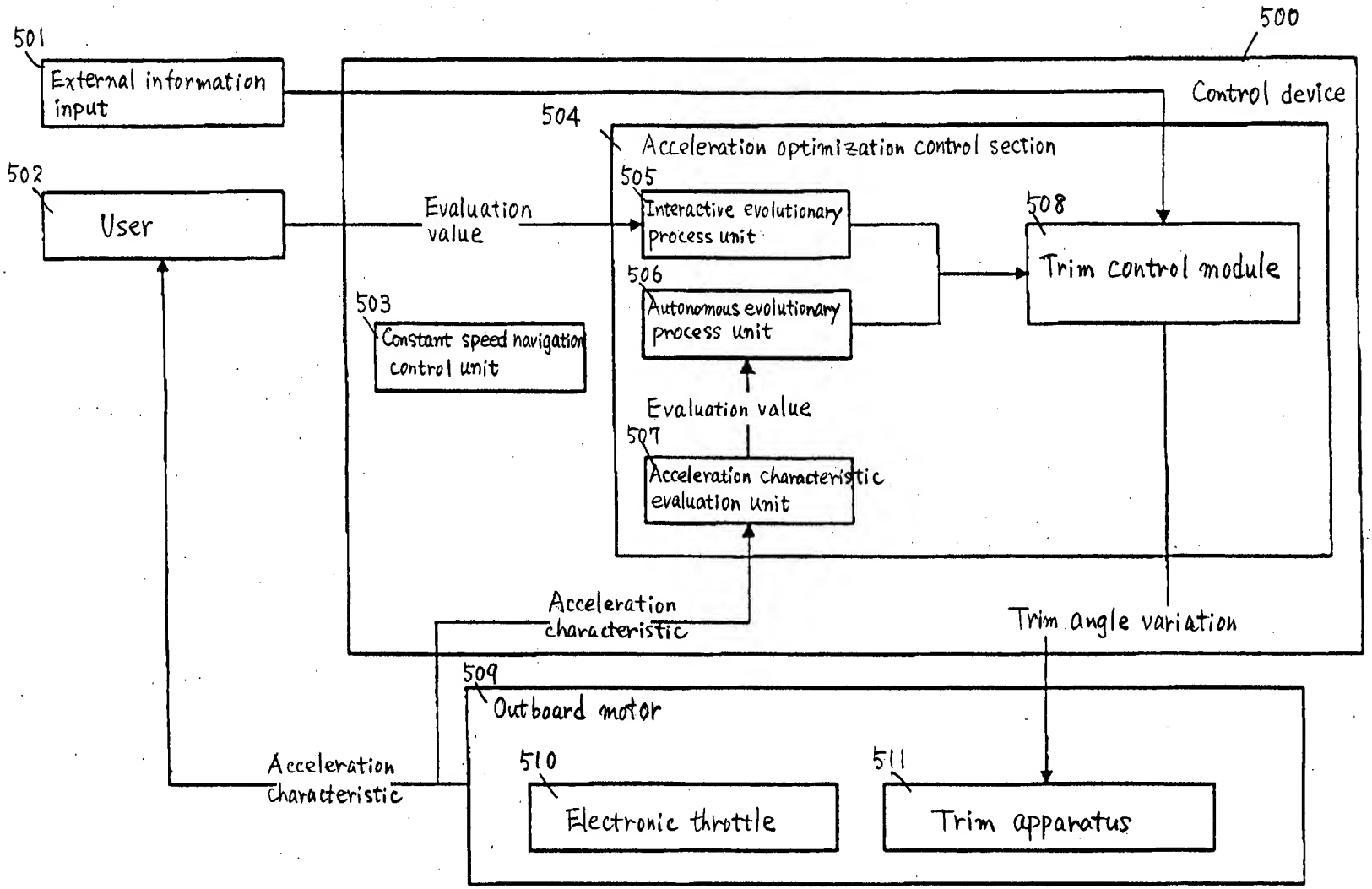
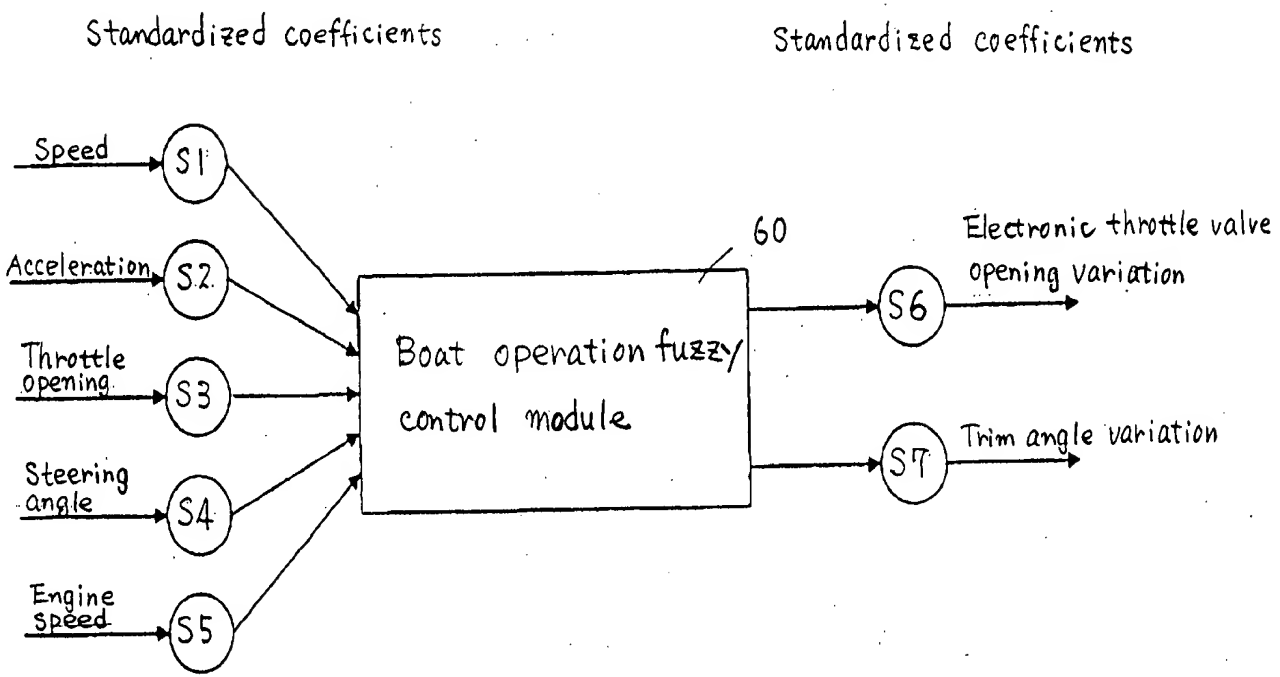


FIG. 5

DOTDET "tch2260



S1	S2	S3	S4	S5	S6	S7

FIG. 6

08108E "H3H/2260

Speed

Acceleration

	FAST	MID	SLOW
PL	−10°	−5°	−1°
PS	−5°	−1°	0°
ZR	−1°	① 0°	③ +1°
NS	0°	② +1°	④ +5°
NL	+1°	+5°	+10°

Fuzzy rule table

Extraction →

①	②	③	④
0°	+1°	+1°	+5°

Perturbation with normalized random numbers added ↓

+0. 5°	+1. 3°	+0. 4°	+6. 1°
−0. 3°	+1. 4°	+2. 0°	+4. 9°
+0. 9°	+0. 6°	+1. 5°	+5. 2°

•
•
•

input: Speed, Acceleration

output: Electronic throttle valve opening variable

FIG. 7

0010274 "h2h2260

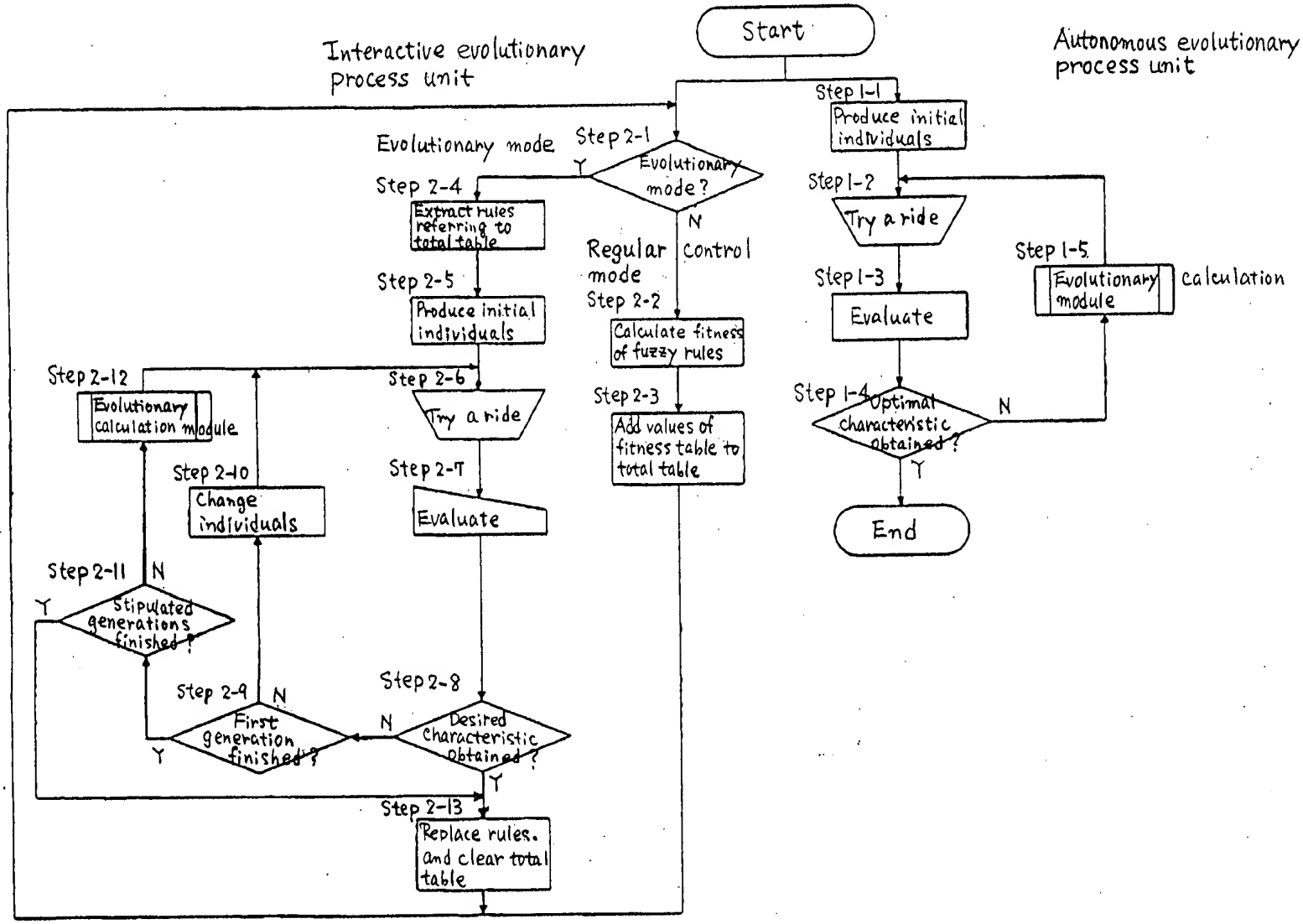


FIG. 8

DOCKET NO. H2442260

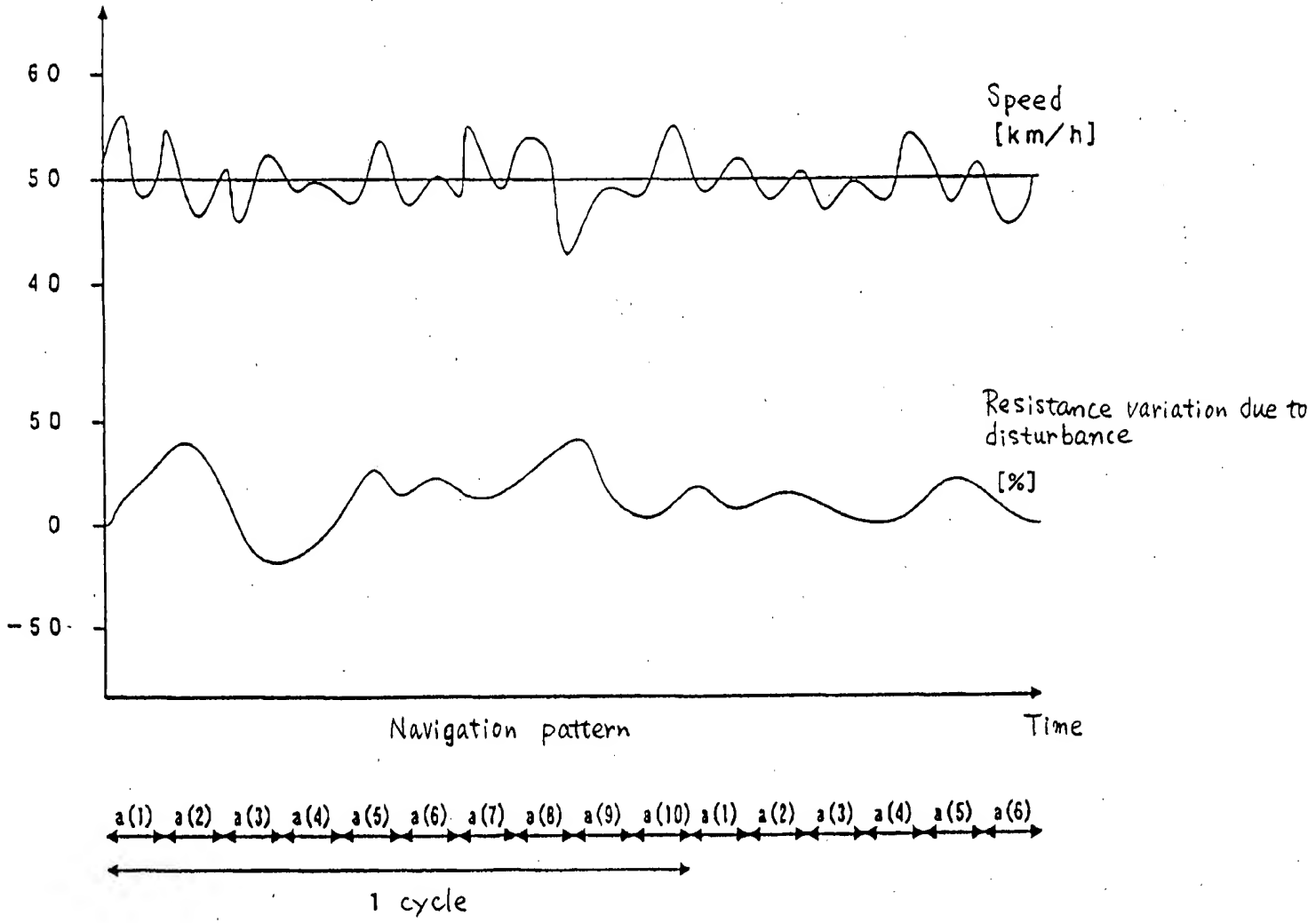


FIG. 9

0070251 h2h22260

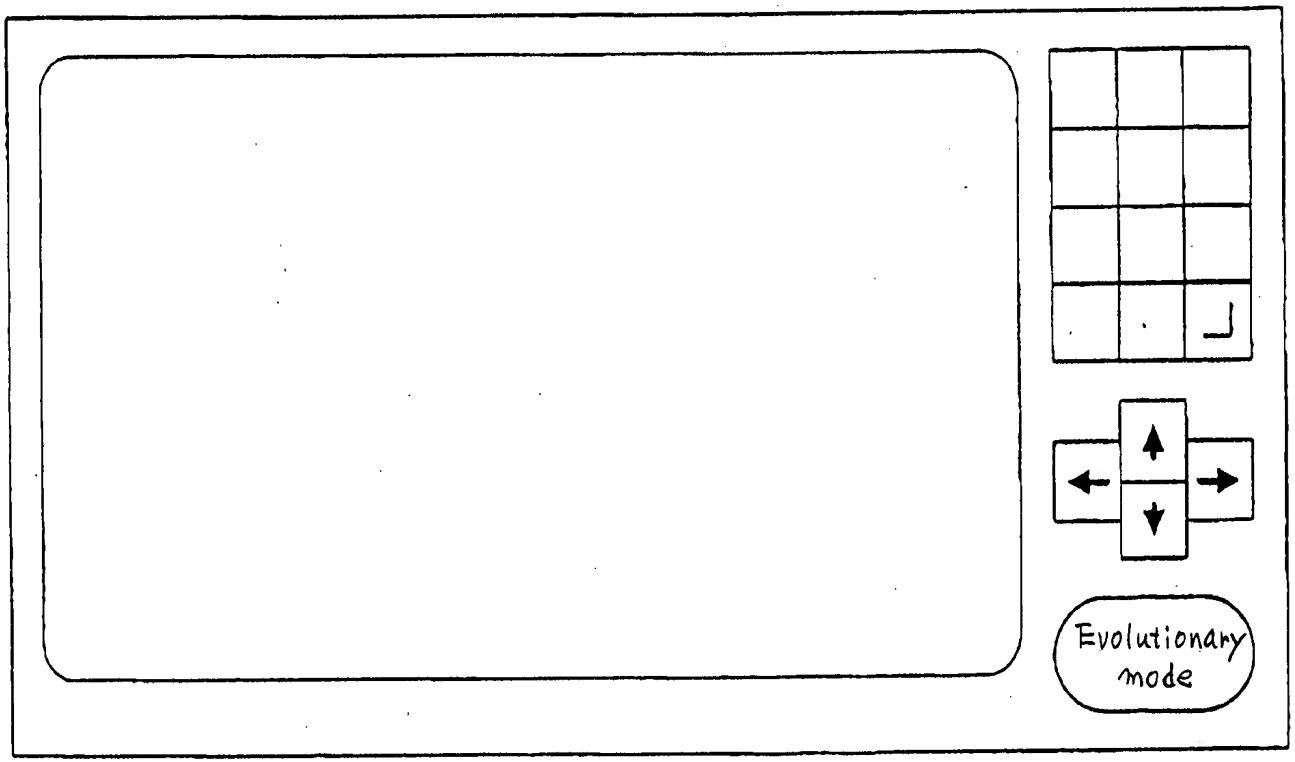


FIG. 10

0070EP "EH23260

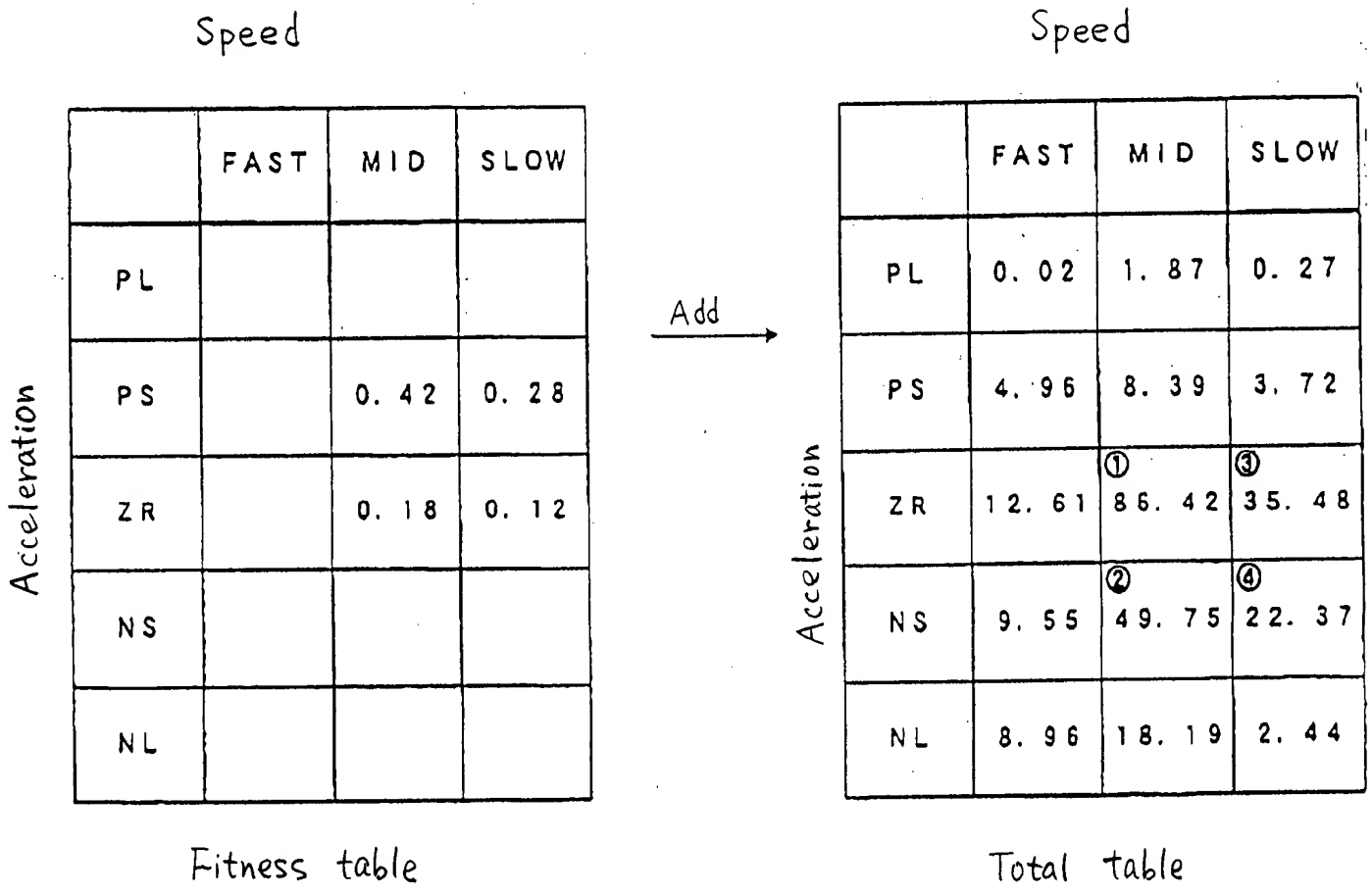


FIG. 11

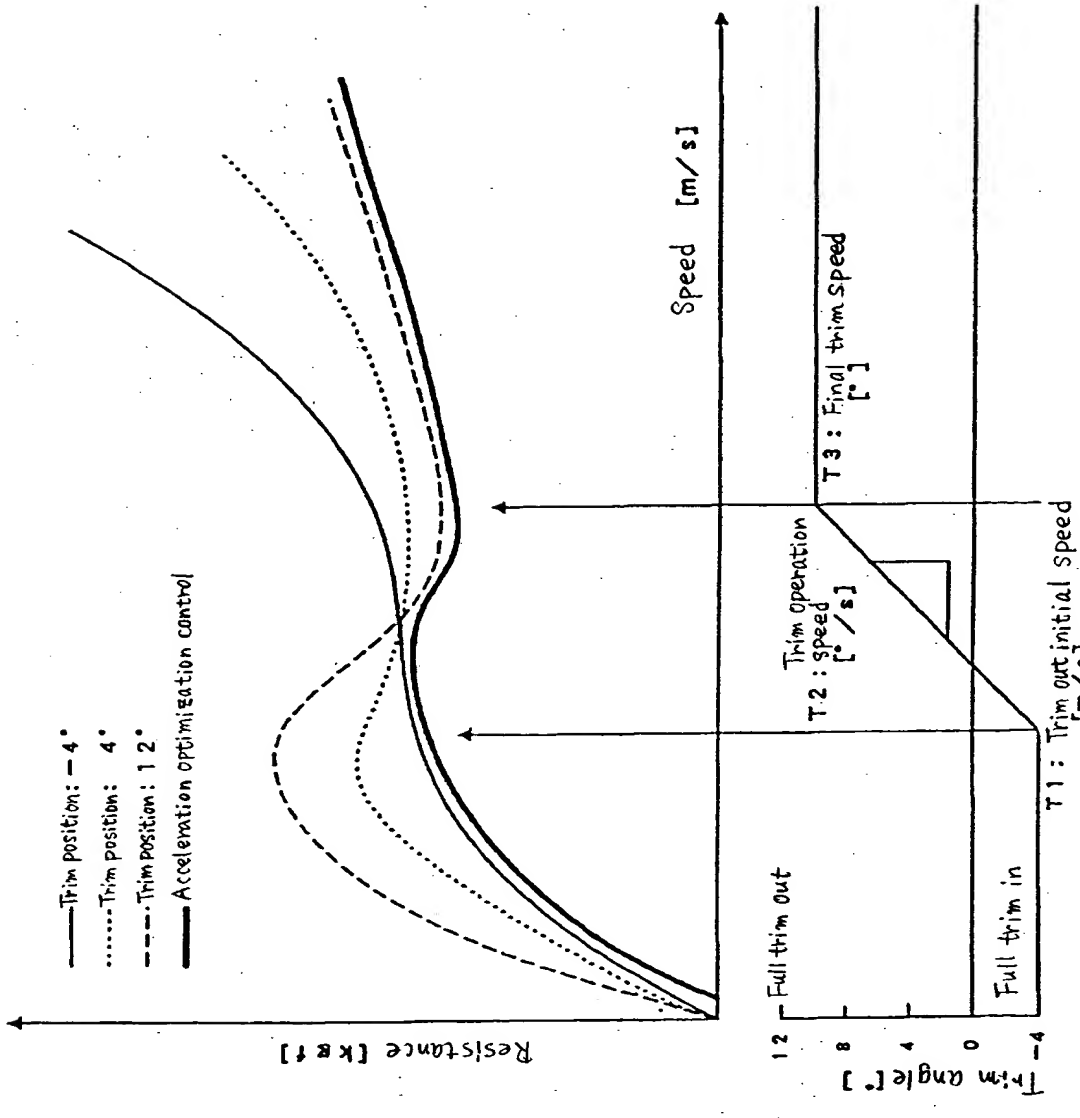

Trim position: −4°
Trim position: 4°
Trim position: 12°
Acceleration optimization control
Resistance [kgf]
Speed [m/s]
Trim angle [°]
12
8
4
0
−4
Full trim out
Full trim in
Trim operation
T2 : speed
[°/s]
T3 : Final trim speed
[°]
T1 : Trim out initial speed
[m/s]

FIG. 12

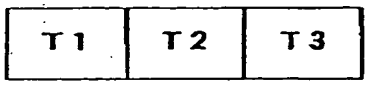

T1
T2
T3

FIG. 13

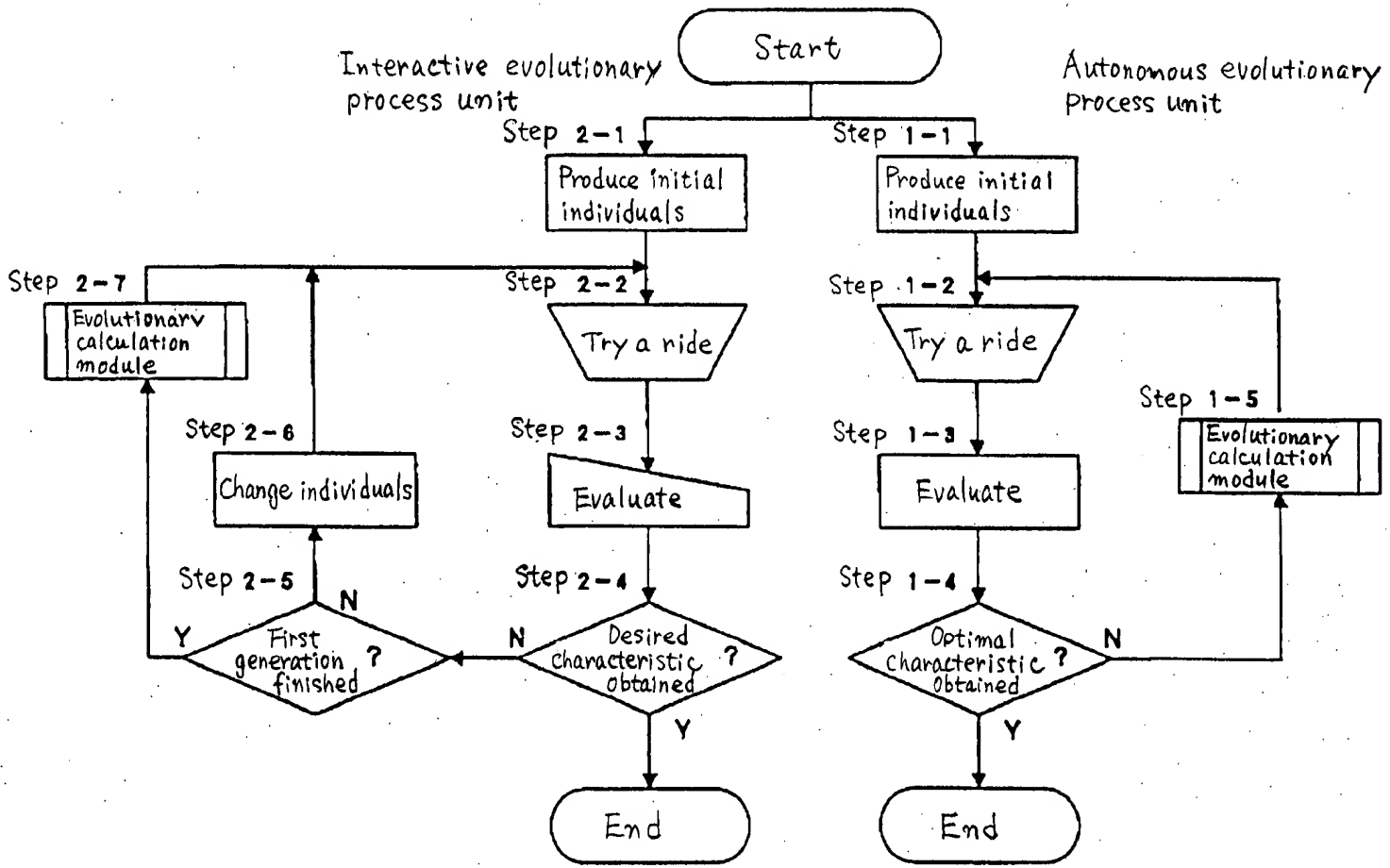

Start
Interactive evolutionary process unit
Autonomous evolutionary process unit
Step 2-1
Produce initial individuals
Step 1-1
Produce initial individuals
Step 2-7
Evolutionary calculation module
Step 2-2
Try a ride
Step 1-2
Try a ride
Step 1-5
Evolutionary calculation module
Step 2-6
Change individuals
Step 2-3
Evaluate
Step 1-3
Evaluate
Step 2-5
Step 2-4
Step 1-4
N
Y
First generation finished ?
N
Desired characteristic obtained ?
Optimal characteristic obtained ?
N
Y
Y
End
End

FIG. 14

Document: EP 0 762 345 A2

Evolutionary computation module (GA)

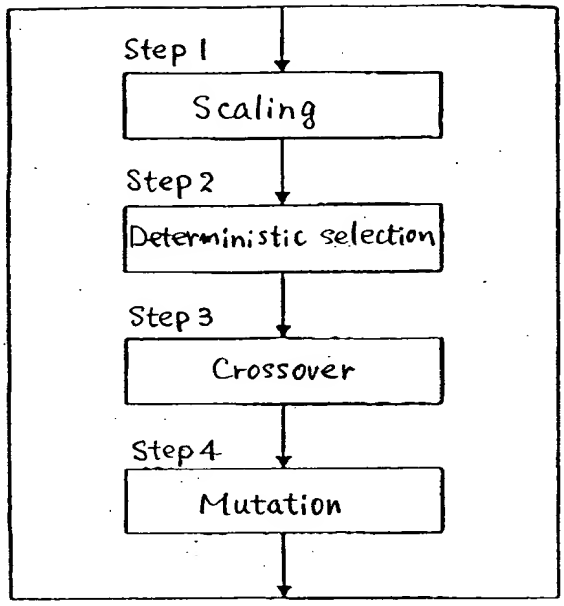


FIG. 15

Evolutionary computation module (ES)

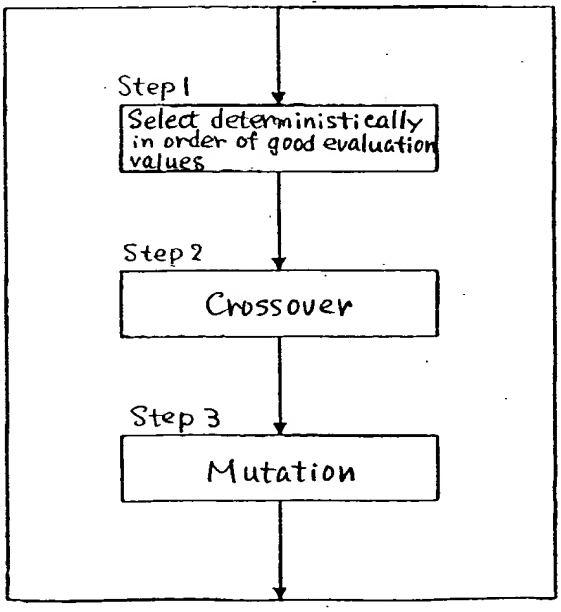


FIG. 16

Evolutionary computation module (EP)

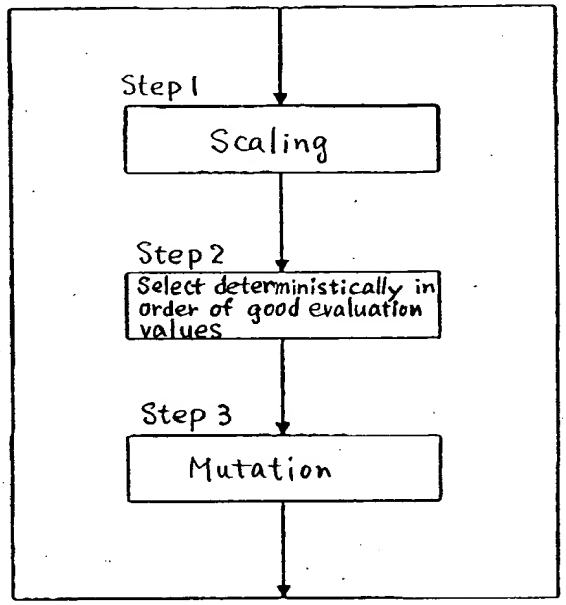


FIG. 17

0010EP1182260

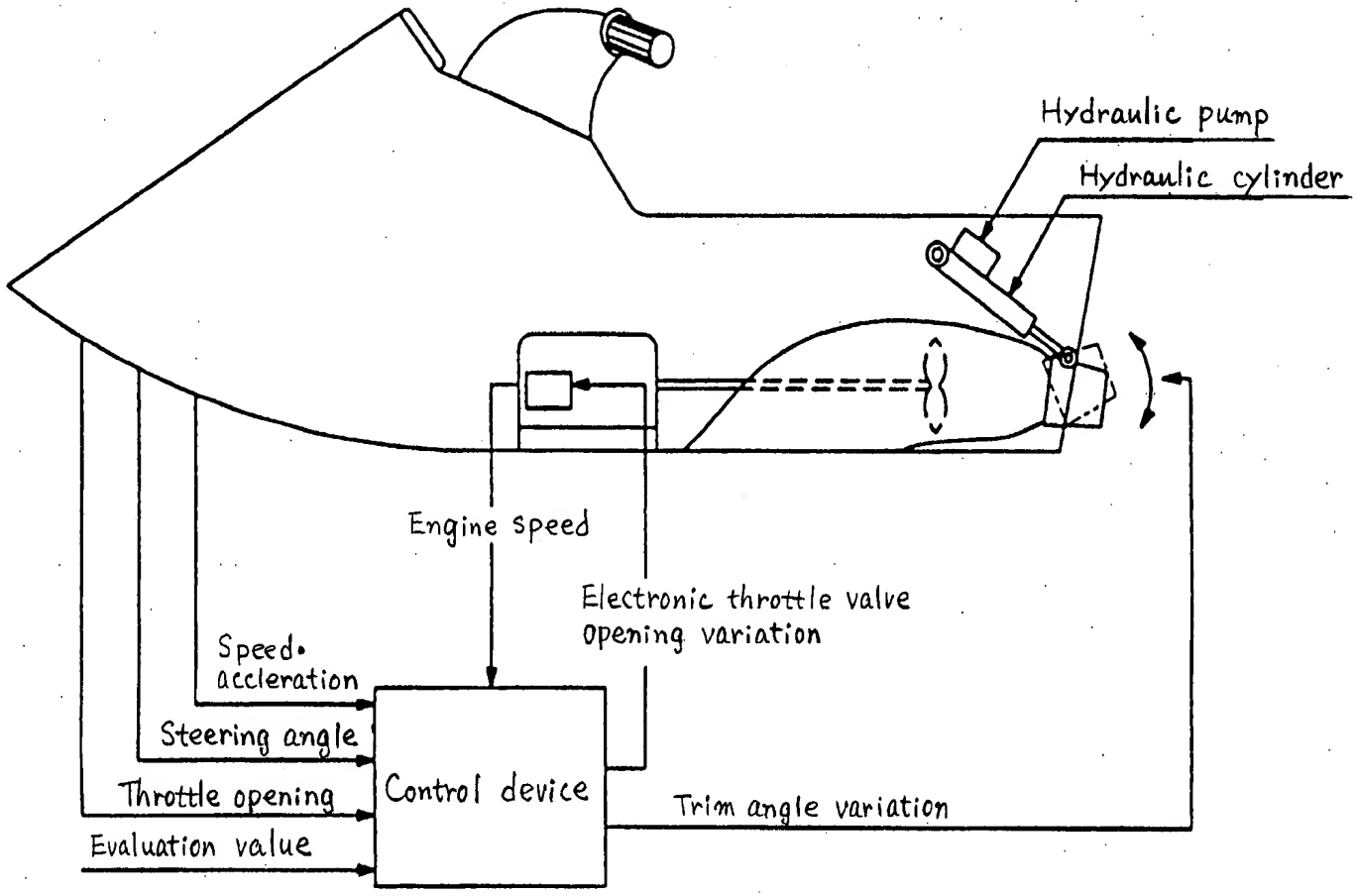


FIG. 18

0070271 tch2260

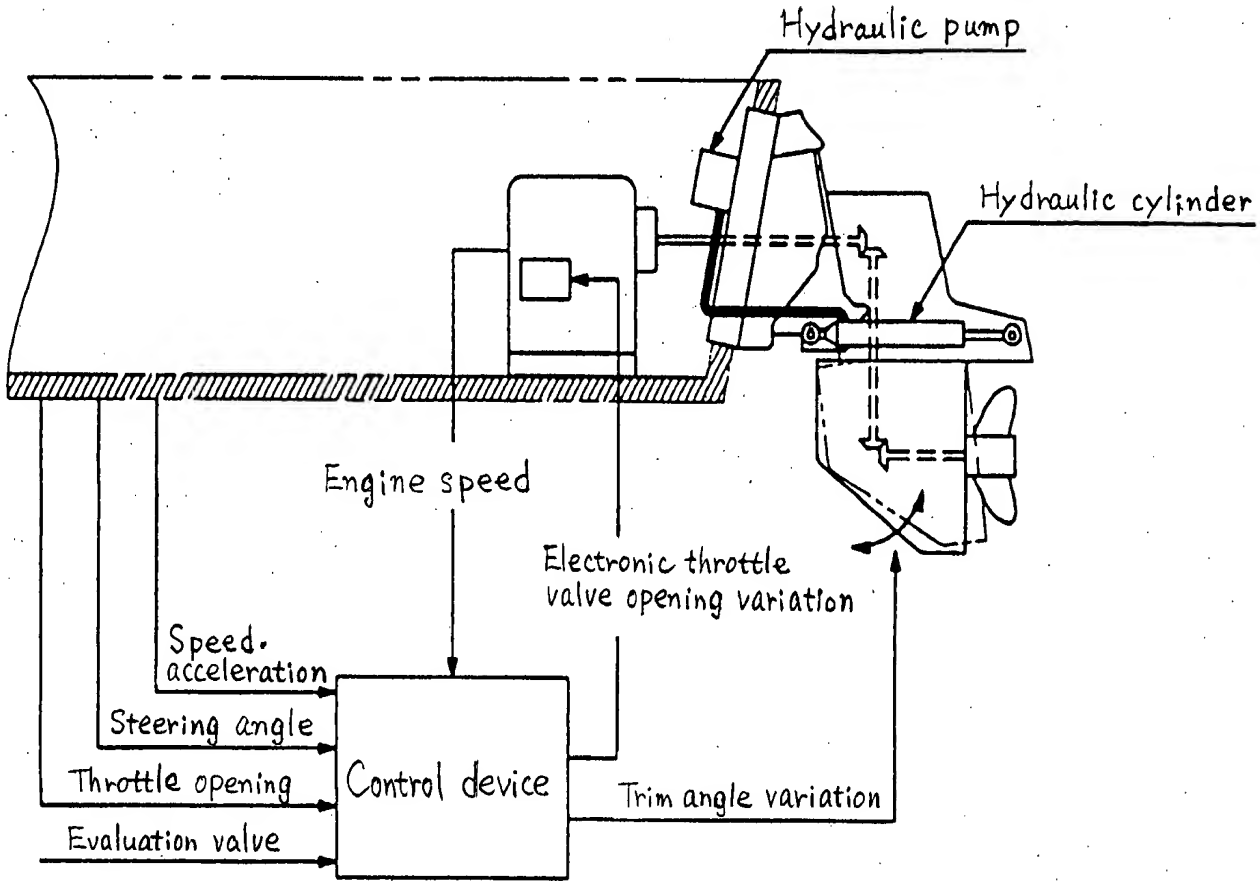


FIG. 19

0070E' hen2260

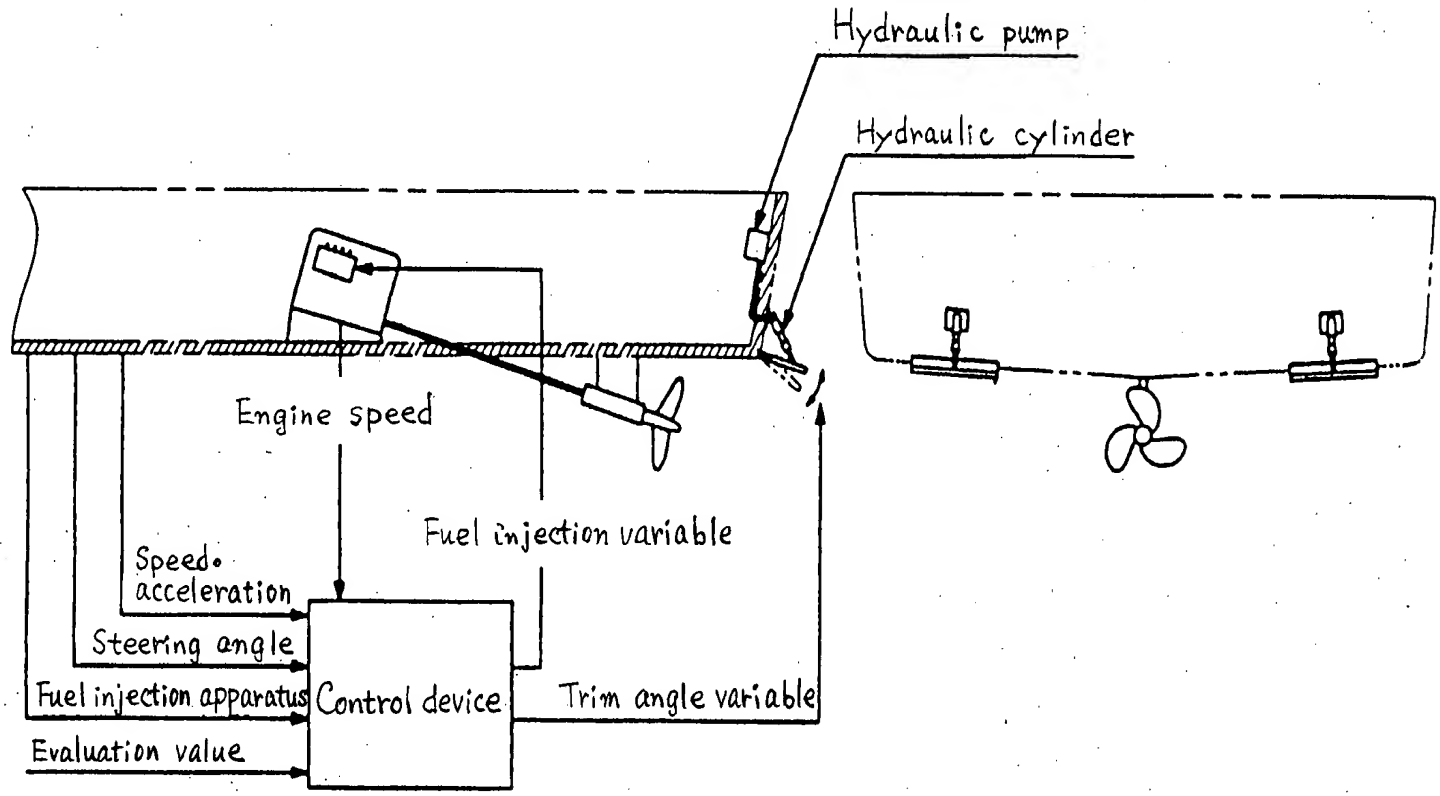


FIG. 20

0070E "EP2262260

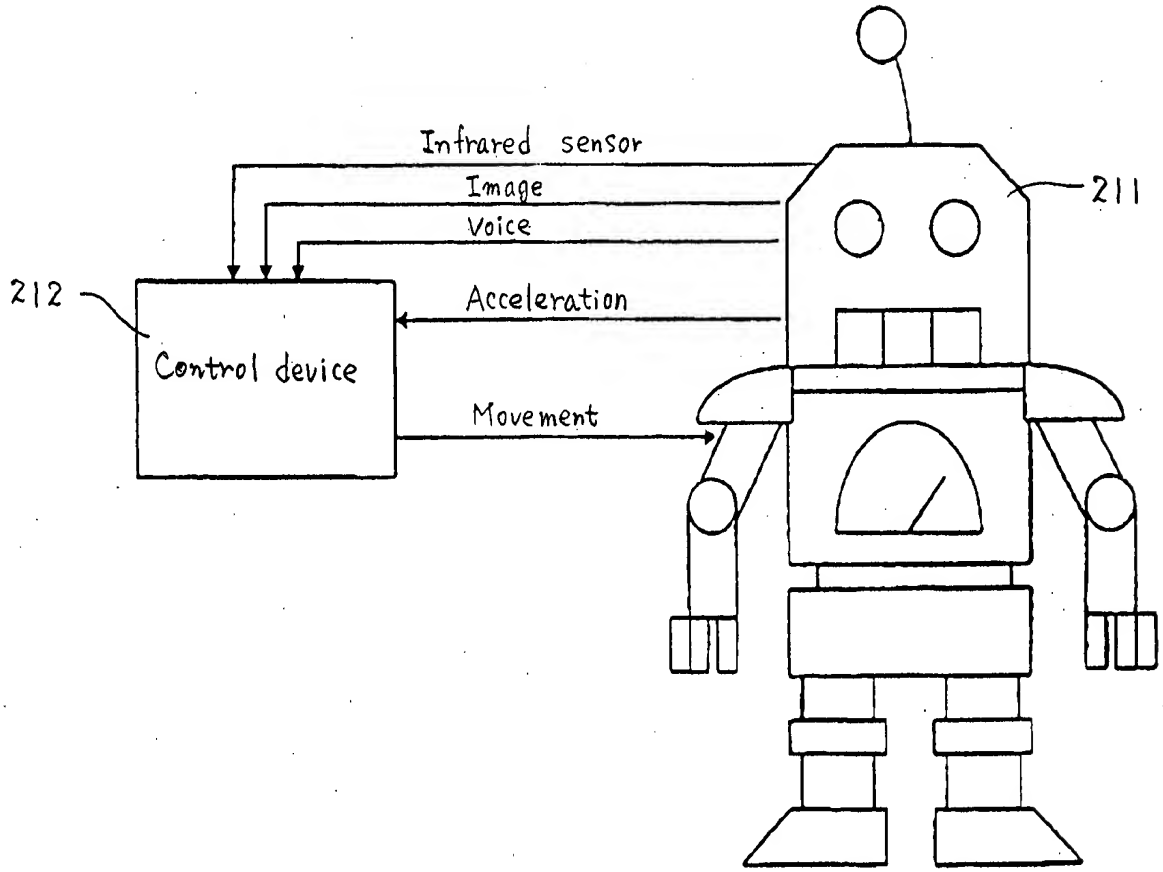


FIG. 21

DOTOCT "H2H/2260

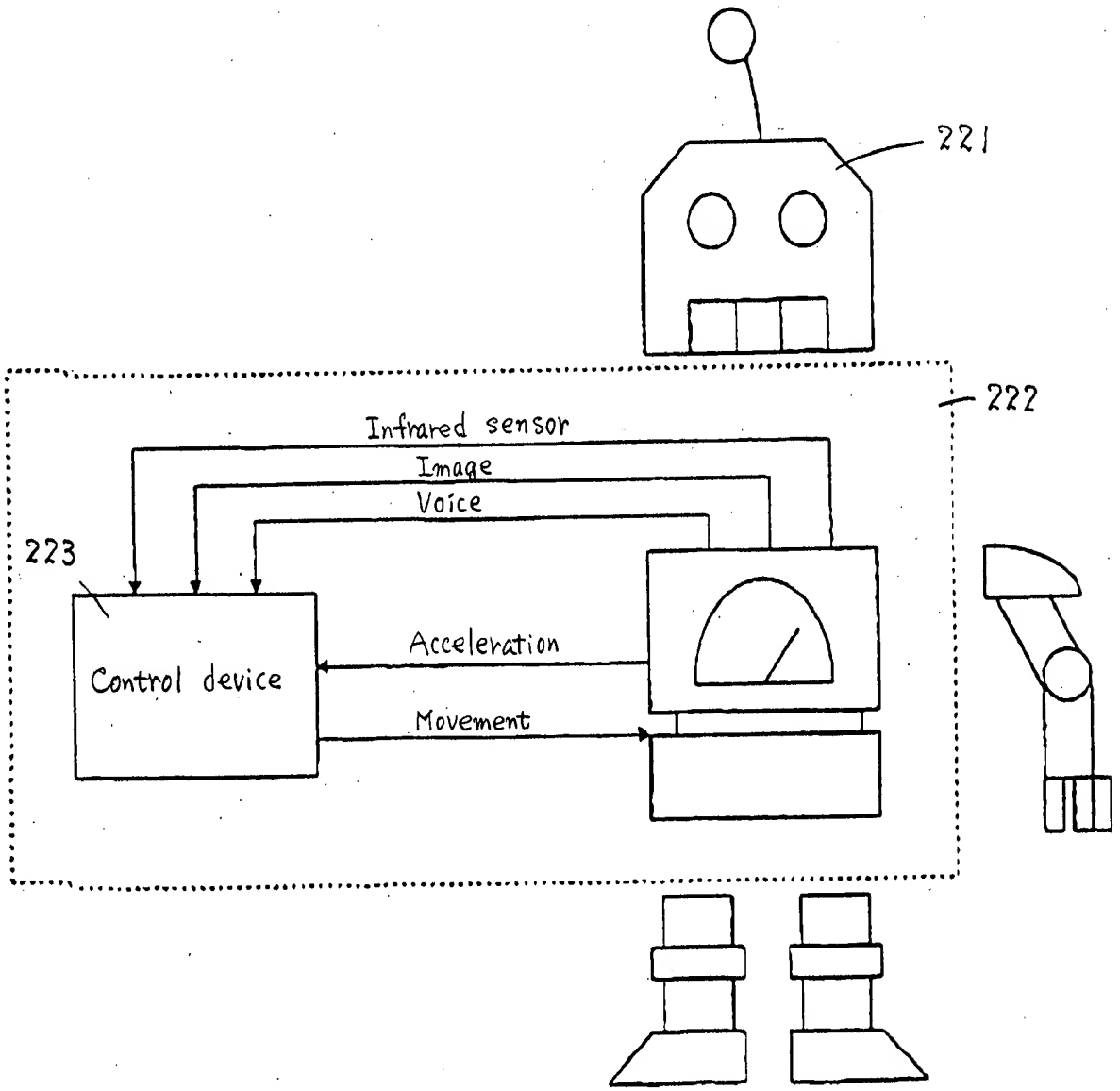


FIG. 22

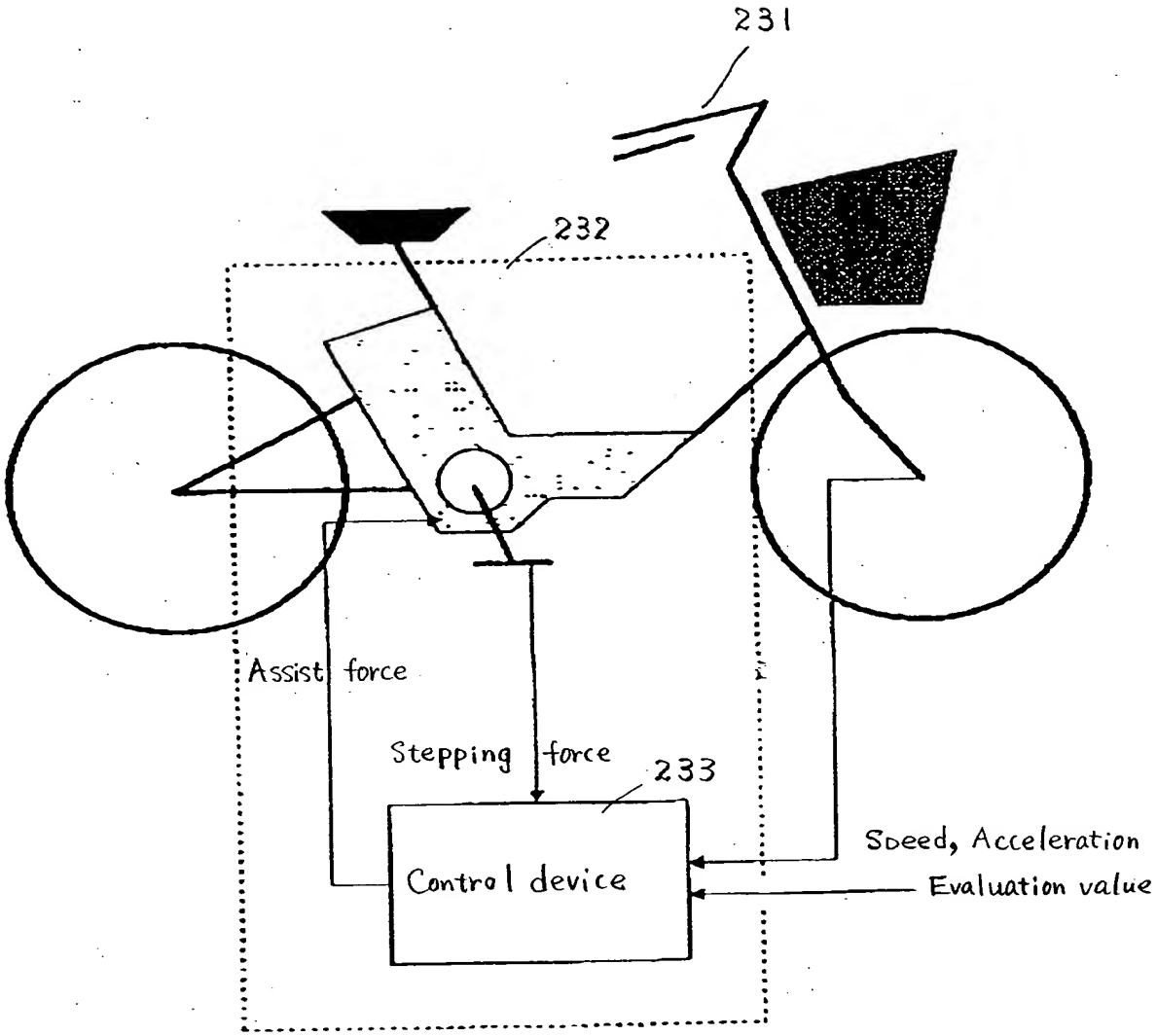

231
232
Assist force
Stepping force
233
Control device
Speed, Acceleration
Evaluation value

FIG. 23